

Appendix D

PLANNING AND DESIGN GUIDE

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The following guide may be used as a check list to organize pipeline planning and design. It is particularly useful as an aid for those new to planning and designing stockwater pipeline systems.

NEBRASKA

Stockwater Pipeline and Tanks Planning and Design Guide

DETERMINE OPERATOR OBJECTIVES

Work with the operator to refine and define operator objectives before spending significant time on detailed planning.

RESOURCE INVENTORY

1. Annual grazing period.
2. Whether or not pipeline will need to operate in freezing weather.
3. Types and maximum number of livestock using system.
4. Type of grazing system to be used.
5. Define and measure area to be serviced by the pipeline.
6. Location and details of existing water sources in the area to be serviced by the pipeline.
7. Details concerning wells and pumps, including yield, condition, depth-to-water surface, and elevation.
8. Availability and cost of bringing in electric power.
9. Reliability and quality of existing water sources.
10. Water source that is proposed for use as supply for pipeline system.
11. Initial topographic information for the service area. This often can be accomplished by study of USGS Quadrangle maps, altimeter surveys, or aerial photos.
12. Geologic considerations which will effect pipeline route including location of shallow bedrock, unsuitable soils, coarse gravel subsoils, old slide areas, swampy areas, sharp breaks in the slope, etc.
13. Property line and ownership considerations which will effect the pipeline route.

References

NCPM 506.10

NCPM 56.10
MSPM Ch. 2

FOTG Std. 556

14. Management factors:

- How frequently are livestock checked?
- Can livestock be quickly moved if the pipeline system fails?

15. Determine the user's desires concerning the system.

16. Site considerations:

- Determine location and details of any buried or overhead utilities in the construction area.
- Is the site within a flood plain?
- Will wetlands be modified or disturbed by installing the project?
- Make archaeological and historical resource survey, if one is required.

NEH 503.03
GM 190 Part
410.25 – 26
NCPM NE506.17
GM 420 Part 401

INTERPRETING, ANALYZING, AND EVALUATING

1. The pipeline and appurtenances will be planned as an integral part of a resource management system. Work with and educate the landuser to accomplish this.
2. Are there other alternatives to the proposed pipeline system? Can existing water sources be improved at less cost?
3. Are there soil or geologic conditions which will limit the type of pipeline system or how it is installed?
4. Are there labor, economic, management, or physical constraints on the system?
5. Is water source quality, timing and availability adequate?
6. Prepare a preliminary analysis of environmental effects and prepare an environmental checklist (NE-CPA-28) and other required documents.

NCPH 506.12

NCPM 506.17
GM 190 Part 410.5
NCPM NE 507-
26(125)

DEVELOPING AND EVALUATING ALTERNATIVES

1. Determine minimum flow requirements during the period of peak stockwater use.
2. Determine desirable drinking tank locations. Standards set maximum distance between drinking locations.

FOTG Std. 614
FOTG Std. 516
MSPM Ch. 2
FOTG Std. 516

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| 3. Determine minimum water storage requirements | FOTG Std. 516 |
| | FOTG Std. 614 |
| 4. Determine drinking tank-type and capacity. | MSPM Ch. 8 |
| 5. Determine storage tank-type and capacity. | MSPM Ch. 8 |
| 6. Based on all known factors, design the pipeline system alternative alignments. | (MSPM Ch. 9) |
| 7. Type of system (automatic pressure, timed, gravity). | MSPM Ch. 3 |
| 8. Based on all available known factors, select a pipe-type and bury depth. | |
| 9. Preliminary design of pump and gravity inlet facilities | MSPM Ch. 8 |
| 10. Preliminary design of drinking and storage tanks, including types, locations and preliminary sizes and elevations. | MSPM Ch. 8 |
| 11. Perform preliminary hydraulics to set size and grades. (North Dakota Pipeline or other approved computer programs may be used to aid with calculations.) | EFM Ch. 3
(MSPM Ch. 9)
(MSPM App. B) |

MAKING DECISIONS AND DOCUMENTING

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| 1. Present developed alternatives to the operator. | |
| 2. Make sure the operator has made a decision before proceeding. | |
| 3. Document decisions in NE-CPA-28 planning notes and on the SCS-CPA-68 Record of Cooperator's Decisions. | NCPM. 506-31 |

IMPLEMENTING DECISIONS

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| <u>Permits:</u> Make sure all required permits are obtained before proceeding with detailed design and layout. | NCPM 506.10
NCPM 506.17 |
| 1. Water right permits | |
| 2. Permits to cross State or Federal land and easements to cross private land. | |
| <u>Approval Authority</u> | NEM NE501.04
Individual |
| 1. Determine approval authority for pipelines, tanks and other appurtenances. | |

Collect Final Data for Design

1. Additional detailed engineering surveys which were not obtained during initial planning. A profile should be run just to the accuracy necessary for the particular installation. This may involve detailed bench level, transit, EDM, altimeter or simply a close study of 7-1/2 minute USGS maps, depending on the installation.

TR62
EFM Ch. 1
MSPM Ch. 4

System Design

1. Detailed hydraulics which were not done previously.
 - Pipeline hydraulics
(Can use North Dakota Pipeline program to aid in calculations)
2. Pressure tank size requirements
3. Pressure, surge and air control features
4. Pump size and pressure requirements
5. System accessory design
6. Quantity calculations (if needed for cost share, bidding or other reasons).
 - Schedule of pipe sizes, type and rating
 - Schedule of tank types, sizes and locations
 - Schedule of valve types and sizes

FOTG Std. 516
MSPM
EFM Ch. 3
(MSPM Ch. 9)

MSPM Ch. 8
MSPM Ch. 6, 8
MSPM Ch. 8
MSPM Ch. 8

Drawings and Specifications

1. Prepare drawings
 - Use standard drawings when possible.
 - Minimum drawings shall include:
 - o Location map or enough description on plan view map to adequately locate job.
 - o Plan view map showing location of all pipelines, tanks and water source.
 - o Profiles along each pipeline. Show location of all appurtenances such as tanks, troughs, hydrants, valves, pressure reducers, etc.

EFM Ch. 5

NEM Part 541

<ul style="list-style-type: none"> o Show elevations including water surface or starting pressure head, ground line, design hydraulic grade line, and static grade line. o Table or drawing notes showing elevations, descriptions, dimensions and size of all structures, valves, special fittings and appurtenances. o Standard details of tanks and pipeline o Special detail drawings of appurtenances not otherwise described. 	
<p>2. Specifications</p> <ul style="list-style-type: none"> • Standard Nebraska practice specifications shall be used to the maximum extent possible. • Special provisions shall be prepared and made a part of the practice specifications when needed. 	<p>FOTG Sec. IV</p> <p>NEM Part 542</p>
<p><u>Operation and Maintenance Plan</u></p> <ul style="list-style-type: none"> • All important aspects of management and operation shall be documented in an operation and maintenance plan (O&M) and discussed with the operator. • Maintenance recommendations shall be included in the O&M plan and discussed with the operator 	<p>MSPM Ch. 11</p>
<p><u>Layout</u></p> <ol style="list-style-type: none"> 1. Set permanent bench marks (2 minimum). <ul style="list-style-type: none"> • Firmly set bench marks out of harms way • Clearly describe in notes • Show on drawings 2. Layout surveys shall be recorded in loose-leaf survey books or special forms and in accordance with TR62 and/or Chapter 1 of Engineering Field Manual. 	<p>EFM Ch. 1 TR62</p> <p>TR62 EFM Ch. 1</p>
<p><u>Compliance Checking</u></p> <ol style="list-style-type: none"> 1. Adequate periodic inspection shall be scheduled and performed during construction. Continuous inspection during construction of stockwater pipelines cannot usually be performed by the SCS. 	<p>NEM 512.30-33 NEM NE512.32 NEM NE505.10</p>

We can make a point to view each contractor's work while the pipe is actually being laid at least once during the season. More frequent visits will be necessary if there is an unusual number of problems cropping up from job to job. We should provide enough inspections to assure ourselves that the pipe and tanks are being installed in accordance with the drawings and specifications.

Properly coached, the landuser can provide useful inspections during construction. Explain to the landuser what the drawings and specifications mean and what to look for as the job progresses

2. As-built drawings should be prepared.

Complete documentation

The following documentation shall be in the case file:

1. Complete planner notes on Conservation Assistance Notes Form NE-CPA-28. Documentation of operator decisions should be complete.
2. Original survey notes
3. Copy of all calculations, initialed and dated by the person doing the work and the person doing the checking.
4. Copy of all drawings
 - Signature of person with approval authority on first drawing
 - As-Built details noted on drawings
5. Specifications, either a copy of specs or list of specs with copy of signature sheet and special provisions.
6. Copy of sheet showing review of drawings and specs by operator.
7. Copy of all statements relating to the completion check.
8. Where underground utilities are located in the construction area, a copy of completed Forms SCS-ENG-5 and SCS-ENG-6 must be in the file.
9. Copy of water rights or signed statement by producer that they are adequate.
10. Completed Environmental Checklist (NE-CPA-28)
11. Cultural Resources Survey (NE-CPA-28), if one is required

NCPM 506

References:

FOTG	NRCS Field Office Technical Guide: Nebraska Practice Standards in FOTG Section IV.
NCPM	NRCS National Planning Manual
NEM	NRCS National Engineering Manual
EFM	NRCS Engineering Field Manual
MSPM	NRCS Montana Stockwater Pipeline Manual
NEH	NRCS National Engineering Handbook
TR62	NRCS Technical Release-Engineering Layout, Notes, Staking and Calculations